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(71) Applicant: ALCATEL USA SOURCING, L.P. [US/US]; 1000 Coit Road, M/S Legl 2, Plano, TX 75075 (US).

(72) Inventors: MANI, Babu, V.; 2325 Terping Place, Plano, TX 75025 (US). STEVENS, Gilman, R.; 850 Quail Rise, Fairview, TX 75069 (US).

(74) Agent: DANAMRAJ, Shreen, K.; Smith, Danamraj & Youst, P.C., Suite 1200, LB-15, 12900 Preston Road, Dallas, TX 75230-1328 (US).

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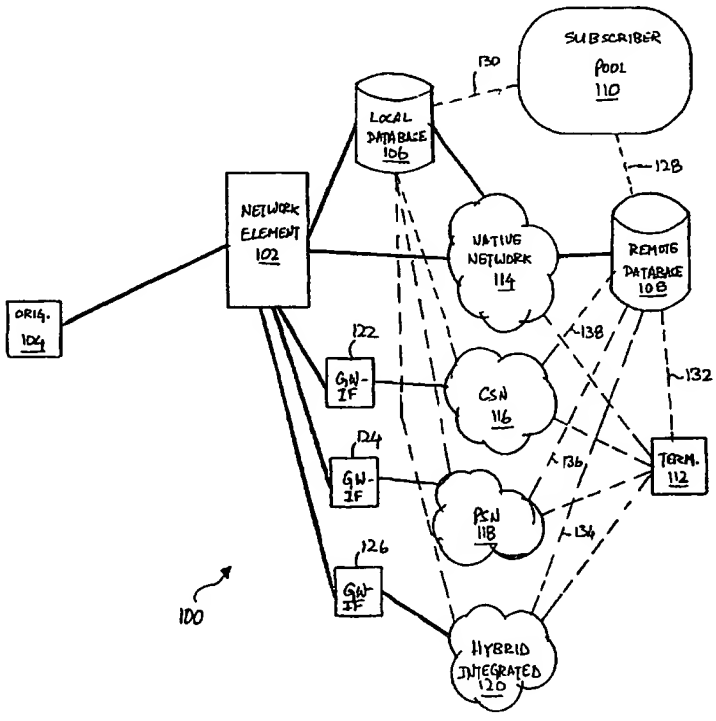
(54) Title: UNIVERSAL COMMUNICATIONS DATABASE SYSTEM AND METHOD FOR INTEGRATED SERVICES



(57) Abstract: A universal communication database method and system for providing multiple types of communications based on a single Personal ID (PID) uniquely assigned to a subscriber. The PID is preferably based on the subscriber's name and is associated with one or more communicant type identifiers which identify to a network element as to the type of communication being engaged with respect to a particular subscriber. Several communication types are supported: wireline and wireless phone communications, multimedia sessions, Internet communication, email, facsimile transmission, pager communications, etc. A generic communication event is defined so as to embrace these multiple types of communication. The unique combination of the PID and a communication type identifier is mapped to various treatment data for the communication events specified for the subscriber. Access privileges data and preference option data are also provided in the universal communications database for modifying the execution treatment of communication events, which database is preferably implemented using a hierarchical database architecture.

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UNIVERSAL COMMUNICATIONS DATABASE SYSTEM AND METHOD FOR INTEGRATED SERVICES

BACKGROUND OF THE INVENTION

Technical Field of the Invention

The present invention relates to telecommunications networks and services and, more particularly, to a system and method for providing a universal communications database for supporting integrated services based on multiple types of communication within a network or a combination of networks.

Description of Related Art

Coupled with the phenomenal growth in popularity of the Internet, there has been a tremendous interest in integrating packet-switched network (PSN) infrastructures (e.g., those based on Internet Protocol or IP) with the existing circuit-switched network (CSN) infrastructures used in today's telephony. From the network operators' perspective, the inherent traffic aggregation in packet-switched infrastructures allows for a reduction in the cost of transmission and the infrastructure cost per end-user. Ultimately, such cost reductions enable the network operators to pass on the concomitant cost savings to the end-users.

In spite of the unprecedented convergence that has been taking place between the PSN-based data communications and CSN-based telecommunications, several deficiencies still remain in the arena of seamless service provisioning. For example, typically either seven- (NXX-XXXX) or ten- (NPA-NXX-XXXX) digit directory numbers (wherein the

XXXX identifies the four-digit customer line number, NXX is the three-digit central office (CO) code, and NPA is the three-digit area code) are used to route calls through the Public Switched Telephony Network (PSTN). With the rise of converged networks, many, and soon most will, have multiple email addresses and several communication device addresses, e.g., cellular phone numbers, pager numbers, facsimile numbers, wireline phone numbers, et cetera. Being able to get in touch with a subscriber, accordingly, typically requires an individual to carry a formidable list of contact numbers and/or addresses. Since each mode or type of communication is based on a different format (because of the different technologies), one cannot use a single contact number or address to communicate with a subscriber for multiple types of communication, thereby frustrating the purpose of having the convenience of multiple services in a putative converged network environment. In addition, although a whole new type of products, e.g., electronic data organizers, have evolved to meet the needs of individuals for collecting and organizing the various lists of contact numbers and addresses, they are not only inconvenient to carry all the time, but also they are simply incapable of effectuating multiple types of communication based on single contact numbers/addresses.

Another example of the deficiencies of the state of the art is in the area of service portability. For instance, at present, the wireline telephone service is tied to a fixed location, namely, a physical port or circuit and a directory telephone number is associated with a particular physical termination. When someone moves to a new residence, he or she needs to contact the local telephone company to establish his/her telephone service.

The individual is given a telephone number and all terminating calls to that telephone number are normally directed to the physical termination at that residence. While a "call forwarding" option is available to redirect a terminating call to a different telephone number, the calls are still directed to a new number which is associated with a different physical termination. Even where solutions such as Local Number Portability allow the subscriber to keep the previous telephone number, the subscriber has to go through the process of establishing a new subscription. In addition, the switching network is required to keep track of all ported numbers. It should be appreciated that the current solutions are woefully inadequate with respect to the provisioning of highly desirable conveniences such as the following: continuing to maintain the telephone service options a subscriber has when moving to a different location or switching to a different service provider; temporarily relocating one's telephone service to a different physical termination without changing the telephone number; subscribing to a telephone service without establishing a permanent relationship between one's telephone number and a physical termination; and contacting a subscriber by dialing the subscriber's "name" rather than a "numeric code."

SUMMARY OF THE INVENTION

Accordingly, the present invention advantageously provides a universal communications database method and system for supporting multiple types of communications based on a single Personal ID (PID) uniquely assigned to a subscriber. The PID is preferably based on the subscriber's name and is associated with one or more communication type identifiers which identify to a network element as to the type of

communication being engaged with respect to a particular subscriber. Several communication types are supported: wireline and wireless phone communications, multimedia sessions, Internet communication, email, facsimile transmissions, pager communications, etc. A generic communication event is defined so as to embrace these multiple types of communication. The unique combination of the PID and a communication type identifier is mapped to various treatment data for the communication events specified for the subscriber. Access privileges data and preference options data are also provided in the universal communications database for modifying the execution treatment of communication events, which database is preferably implemented using a hierarchical database architecture.

In one aspect, the present invention is directed to a memory structure for storing a universal communications database usable in effectuating an integrated communications infrastructure. The universal communications database memory structure comprises a profile array including a plurality of PID values, each of which is uniquely associated with a particular subscriber registering with the universal communications database. At least one communication type identifier is associated with each PID value as an extension, suffix, or prefix thereto, wherein the communication type identifier operates to indicate to a network element the type of a communication event engaged with respect to a specific subscriber's PID value. Also included in the database is a structure corresponding to each PID value for storing a plurality of treatment data relating to the PID value based on its communication type identifiers. In operation, when a message signal indicative of a communication event is received in the network

element, wherein the signal includes a specific PID value and associated communication type identifier, the signal is translated to provide appropriate treatment data for effectuating the communication event with respect to the specific subscriber to whom the PID value is assigned in the universal communications database.

In another aspect, the present invention is directed to a method of effectuating communication based on a PID uniquely associated with a subscriber. Upon receiving in a network element a message signal indicative of a communication event with respect to the subscriber, wherein the signal includes the PID and a communication type identifier, the signal is analyzed to identify the communication event by examining the communication type identifier. A first database is queried to determine appropriate treatment data for the communication event based on the PID. Thereafter, the communication event is effectuated depending on the treatment data, if such data is available at the first database. Otherwise, a second database is queried by the network element to determine the treatment data for the communication event based on the PID. Upon retrieving the appropriate treatment data for the communication event from the second database, the communication event is effectuated with respect to the subscriber by utilizing the retrieved treatment data.

In yet another aspect, the present invention is directed to a computer-accessible medium operable with a network element, the network element interacting with a universal communications database having PID indicia uniquely assigned to subscribers, wherein the computer-accessible medium carries a sequence of instructions provided for executing service logic with respect to a communication event based on the PID indicia. The service

logic, when executed by a processor forming a portion of the network element, causes the processor to perform the following steps. Upon receiving in the network element a message signal indicative of the communication event with respect to a particular subscriber, wherein the signal includes a specific PID indicium assigned to the subscriber and a communication type identifier, the signal is analyzed to identify the communication event by examining the communication type identifier. Thereafter, the universal communications database is queried by the network element to determine appropriate treatment data for the communication event based on the PID indicium. Subsequently, the communication event is effectuated for the subscriber based on the treatment retrieved from the universal communications database.

In yet further aspect, the present invention is related to a database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers. A communication type identifier is coupled (as an extension, for example) to a particular PID indicium assigned to a specific subscriber for identifying a communication event. In accordance with the database record management method, when a PID indicium that is unknown to a local database associated with the network element is received thereat for effectuating a communication event, the network element queries a remote database for a profile record associated with the specific subscriber, wherein the profile record includes the specific subscriber's PID indicium and treatment data relating to the specific subscriber's PID. Upon processing the particular communication event, the network element updates its local database by adding the profile record for the specific subscriber. Also, the

network element requests the remote database to inform the local database when any changes in the the specific subscriber's profile record are effectuated at the remote database. Depending upon a configurable time period for monitoring activity, the profile record associated with the specific subscriber's PID is deleted from the local database if the profile record is not used by the network element in a predetermined time period.

In a still further aspect, the present invention is directed to a call porting method for providing universal mobility to subscribers in a communications network having a database for storing PID data uniquely assigned to subscribers. A plurality of profile records are provided in the database wherein each profile record includes an association between the PID data assigned to a particular subscriber and a current telephony port ID or address used by that subscriber. Upon subscribing to a telephony service provided by a first service provider, a user registers at the database as a subscriber, using a first telephony port with a first telephony port address that is served by a first network element operated by the first service provider. A dial tone is available to the subscriber at the first telephony port for effectuating registration with the database, whereupon the first telephony port address is associated with the user/subscriber's unique PID. When a message signal is received in the first network element, which signal is indicative of a phone call with respect to the user and includes the user's unique PID, a determination is made if the phone call can be effectuated by ascertaining whether the user's PID is currently associated with the first telephony port address. If so, the phone call is then effectuated using the first telephony port address. Otherwise, the first network element queries the database to determine if the user has registered

the user's PID from a second telephony port address. If it is determined that the user has registered the user's PID from a second telephony port address, the phone call is effectuated using the second telephony port address for the user.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present invention may be had by reference to the following Detailed Description when taken in conjunction with the accompanying drawings wherein:

FIG. 1 depicts an exemplary embodiment of the present invention wherein a universal communications database is advantageously provided for facilitating integrated services based on unique PIDs assigned to registered subscribers;

FIG. 2 depicts an exemplary hierarchical arrangement of a universal communications database of the present invention;

FIGS. 3 and 4A-4B depict database portions comprising an exemplary universal communications database of the present invention wherein communication events are defined based on extensible markers associated with subscribers' unique PIDs and various attributes relating thereto;

FIG. 5 is a flow chart depicting the steps involved in an exemplary method of effectuating a communication event in accordance with the teachings of the present invention;

FIGS. 6A and 6B depict a flow chart which includes the steps involved in an exemplary database record management method for use with a hierarchical universal communication database of the present invention;

FIG. 7 depicts an exemplary communications network system provided in accordance with the teachings of the present invention wherein universal mobility is accomplished for a subscriber when the subscriber moves to a different serving area or switches service providers; and

FIGS. 8A and 8B depict a flow chart which illustrates the steps involved in an exemplary call porting method for accomplishing universal mobility in accordance with the teachings of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

In the drawings, like or similar elements are designated with identical reference numerals throughout the several views thereof, and the various elements depicted are not necessarily drawn to scale. Referring now to FIG. 1, depicted therein is an exemplary embodiment an internetworking network arrangement 100 wherein a universal communications database, preferably hierarchically organized into a local database 106 and a remote database 108, is advantageously provided for facilitating integrated services in accordance with the teachings of the present invention. A profile array (not shown in this FIG.) is included in the databases wherein a single unique Personal ID (PID) is assigned to each of the subscribers in subscriber pool 110. The local database 106 is operably coupled to a network element (e.g., an exchange, switching point, etc.) 102 which is provided as a node in a network 114 wherein the databases and network elements can interact with each other without protocol conversions, media gateway/interfaces, and the like. Accordingly, the network portion 114 may be considered as the "native" network for the network element 102 and the databases 106, 108. Those skilled in the art should readily recognize that the network 114 may

be operable as a circuit-switched network (CSN), a packet-switched network (PSN), or a combination thereof.

Further, the network element 102 is preferably operable with one or more media gateways/interfaces (GW-IF) for effectuating multiple types of communication in accordance with the teachings of the present invention. By way of example, a GW-IF 122 is provided for interoperability with a CSN network 116 for carrying out circuit-switched services. In similar fashion, GW-IF 124 and GW-IF 126 are exemplified for effectuating interoperable internetworking functionality between the network element 102 and a PSN-based network infrastructure 118 and a hybrid/integrated network infrastructure 120, respectively.

The remote database 108 of the present invention is preferably interoperable with the networks 116, 118 and 120 by way of appropriate protocols/interfaces for effectuating multiple integrated communications/services for a subscriber. Database interfacing paths 138, 136, and 134 are illustrative with respect to the CSN network 116, PSN network 118, and the hybrid/integrated network 120, respectively. Further, these networks are also interoperable with the local database 106 associated with the network element 102.

Preferably, the profile array information comprising the unique PID data for the subscribers (i.e., users registered at the remote database 108) is provided to be configurable by the subscribers, network operators, and the service providers such as wireline and wireless phone service providers, paging service providers, mobile Internet access providers, email service providers, Internet Service Providers (ISPs), Internet Access Providers (IAPs), Application Service Providers (ASPs), etc. Preferably, the various

network operators and service providers have service agreements with the universal communications database operator such that, for example, when a registered subscriber of the database also becomes a subscriber of a particular service provider, the service provider can interact directly or indirectly with the database to reconfigure the profile record associated with the registered subscriber. In addition, the registered subscriber may also cause a suitable modification to the profile record associated with the subscriber's unique PID indicium upon subscribing to a service from a service provider so as to effect a correspondence between the PID indicium and the particular service's treatment data which is to be used for effectuating a communication event pertaining to that service. As depicted in FIG. 1, reference numerals 128, 130 and 132 exemplify a plurality of interactive paths available to the subscribers for interacting with the databases 106 and 108. For instance, such paths may preferably be implemented using Web-based mechanisms.

As will be set forth hereinbelow in greater detail, the PID indicia are associated with "standardized" communication type identifiers each of which identifies to a network element such as, e.g., network element 102 of the network arrangement 100, as to the type of a communication event. That is, for each type of communication, a specific identifier is implemented to indicate to the network elements the type of communication being engaged when a signal or message relating to a communication event is received thereat. Several such identifiers are contemplated within the scope of the present invention: wireless telephony communication identifier, wireline telephony communication identifier, facsimile transmission communication identifier, email communication identifier, IP-based

communication identifier, pager communication identifier, multimedia communication identifier, etc.

In exemplary general operation, when a communication event message or signal originated by an originating party 104 is received at the network element 102, which communication event is intended for a subscriber 112 (i.e., terminating party) registered with the universal communications database, a query is launched to the local database 106 to determine the treatment data for the received PID based on the communication type identifier included in the message. The communication event is effectuated thereafter with respect to the terminating party 112 associated with the received PID. The remote database 108 will be queried if the local database 106 is unable to provide the treatment data.

Referring now to FIG. 2, depicted therein is an exemplary hierarchical database arrangement of a universal communications database 200 provided in accordance with the teachings of the present invention. A national PID database or registry 202 is preferably operable by a database registrar 208 for providing centralized database storage, maintenance, record-keeping, and registration. The database registrar 208 may employ any known or hitherto unknown mechanism for assigning PIDs to potential subscribers. By way of example, a fairness-based algorithm such as first-come-first-served may be implemented. Also, the database registrar 208 is preferably operable to resolve potential conflicts that may arise when two subscribers with identical personal indicia may attempt to register substantially at the same time.

A plurality of regional-level databases, e.g., databases 204A - 204C, are provided as intermediary databases to which queries may be launched by network elements when PID-based communication event messages received thereat are not resolved by the use of local databases such as, e.g., databases 206A through 206F. Also, a network element may directly query the national PID database 202 when its local database does not have the necessary information to effectuate a communication event with respect to a particular PID. Accordingly, a remote database such as the remote database 108 shown and described in reference to FIG. 1 hereinabove may comprise a regional-level database or the national PID database 202.

FIGS. 3 and 4A-4B depict the various aspects of the universal communications database of the present invention for effectuating multiple types of communication based on single unique PIDs assigned to the registered subscribers. As described in the foregoing, each type of communication is identified by a standardized communication type identifier, which is preferably provided as an extensible marker or extension to the PIDs. A PID-extension array 300 forming a database portion of the universal communications database is exemplified in FIG. 3, wherein each subscriber PID 302 is provided with one or more extensions to identify the various types of communication events that may be effectuated for a particular subscriber using a single unique PID. For example, EXT.1 304-1 through EXT.N 304-N are illustrated for PID-1 through PID-K indicia, each extension set for a particular PID indicium forming at least a portion of a PID profile record associated therewith. Those skilled in the art should readily recognize that although each subscriber PID is depicted with the same number of extensions (i.e., N extensions) in the database portion 300,

it is not necessary that each PID be associated with the same number of communication type identifiers to practice the present invention. Accordingly, the PID profile records of the database portion 300 may have different dimensions in some exemplary embodiments.

Further, the communication type identifiers contemplated herein may not be solely limited to extensible markers appended to the PID indicia. Instead, they may be provided as prefixes or suffixes, or some other portion coupled to the PID indicia depending upon the requirements of a particular implementation.

FIG. 4A depicts a database portion 400 exemplifying another aspect of the universal communications database of the present invention, wherein a communication type identifier column 402 comprising standardized extension markers is mapped to a communication event column 404 which specifies the various types of communication supported by the universal communications database. Congruent with the discussion set forth hereinabove, a plurality of extension identifiers, reference numerals 406-1 to 406-K, are illustrated. Each identifier identifies a particular communication mode: email 408-1, fax transmission 408-2, voice communication 408-3 (which may be further differentiated into wireless and wireline events), pager communication 408-4, IP-based multimedia communication 408-K, et cetera.

FIG. 4B depicts a database portion 450 exemplifying another aspect of the universal communications database provided in accordance with the teachings of the present invention. A PID indicia column 451 is mapped to a set of attributes 453 comprising at least a portion of a PID profile record which includes various data for processing, effectuating, routing, or

modifying a particular communication event for a specific PID. The unique PIDs assigned to the subscribers registering at the universal communications database are preferably based on the subscribers' personal indicia, e.g., given name, et cetera. A plurality of PID indicia, for example, PID-1 452-1 through PID-K 452-K are illustratively provided in the database portion 450. Associated with each PID indicium are: subscriber's name 454, address 456, subscriber's primary voice communication address 458 (e.g., wireless or wireline phone number), secondary voice communication address(es) 460, subscriber's pager and fax number(s) 462, one or more email address(s) 464, etc. In addition, each PID profile record preferably contains an access privileges portion 466 and a preference options portion 468 for modifying and qualifying a particular communication event. For example, these portions may comprise time-of-day preferences, device-dependent delivery options, call diversion options, algorithms to resolve multiple secondary phone numbers or email IDs, etc. Accordingly, it should be apparent to those skilled in the art that any portion of the attribute set 453 of a particular profile record may be considered as a "call" treatment data portion used by a network element for obtaining network routing number(s), wireless or wireline phone address(es) for termination and/or origination, email address(es), pager/fax number(s), destination number(s), IP addresses, Uniform Resource Locators (URLs), *mailto* address(es), and various related privileges and options.

Referring now to FIG. 5, depicted therein is a flow chart comprising the steps involved in an exemplary method of effectuating a communication event in accordance with the teachings of the present invention. Upon receiving in a network element a signal or message indicative of a

communication event with respect to a particular subscriber (step 502), which signal/message comprises at least the PID indicium for the subscriber and a communication type identifier, the signal/message is analyzed to determine the type of the communication to be effectuating by examining the communication type identifier (step 504). A first database is queried by the network element (e.g., a local database associated with the network element) to determine the treatment data for the communication event identified by the communication type identifier (step 506). Thereafter, a determination is made as to whether the first database includes sufficient or no information with respect to the PID data value received at the network element in order to effectuate the communication event (decision block 508). If the first database provides sufficient treatment data, the communication event is effectuated accordingly for the subscriber (step 514). Otherwise, the network element queries a second database (e.g., a regional database or a national database) (step 510) to obtain the necessary treatment data (e.g., routing information, terminating number information, etc.) to complete the communication event (steps 512 and 514).

FIGS. 6A and 6B depict a flow chart which includes the various steps involved in an exemplary database record management method for use in a hierarchically organized universal communications database of the present invention. Upon receiving in a network element a message signal indicative of a communication event for a subscriber (step 602), a determination is made if the communication transaction to be effectuated is based on a PID value (decision block 604). If the communication transaction is not based on PID indicia, conventional call treatment is provided by the network element (step 608), which may include interaction with legacy service nodes

(e.g., Service Control Points (SCPs) operable in architectures such as the Intelligent Network (IN), Advanced Intelligent Network (AIN), or Wireless Intelligent Network (WIN)).

If the communication to be effectuated is triggered on a PID value, then a further decision is made to determine whether a profile record associated therewith is available in a local database (decision block 606). If the local database contains the PID's profile record, treatment data therefor is obtained for effectuating the communication event. Otherwise, a remote database is queried by the network element to obtain a profile record for the received PID value and process the communication event (steps 610 and 612). Thereafter, the local database is updated with the new profile record retrieved from the remote database (step 614).

In accordance with the teachings of the present invention, the remote database is also requested to inform the local database of any changes that may take place in the profile record retrieved therefrom (step 618). Accordingly, such changes are also reflected in the local database's new PID profile record as they are effected in the remote database. To manage storage/maintenance requirements, the local database is preferably provided with the capability to delete the new PID record if there is no communication activity relating to that PID within a configurable time period (step 620).

Referring now to FIG. 7, depicted therein is an exemplary communications network system 700 that provides universal mobility for subscribers in accordance with the teachings of the present invention. Subscriber A is a registered subscriber of a remote database 714 (e.g., a national database) wherein the profile record for the unique PID assigned

to Subscriber A contains the current port ID and routing information associated with a wireline telephony service that Subscriber A currently receives. The physical port 706 used by Subscriber A to receive the service is served by a first network element, i.e., switch, 702, which may be an end office disposed in a local exchange carrier (LEC) network. A local database 710 operable in accordance with the teachings of the present invention is co-located with the first network element 702.

In the exemplary scenario depicted in FIG. 7, an originating party 703 may initiate a call (i.e., a wireline communication event) to Subscriber A (i.e., terminating party 711) using the unique PID assigned to Subscriber A and an appropriate communication type identifier. The network element 702 resolves the PID indicium and communication type by querying the local database 710. Because the ID/routing information associated with the current port 706 is available to the network element, the call is terminated to the telephony station used by Subscriber A. When Subscriber A moves to a different geographic area (e.g., across a Local Access and Transport Area or LATA) or switches to a different telephony service provider where a separate port 708 is provided, Subscriber A de-registers from the previous port 706 and registers again from the new current port 708 at the remote database 714, which new current port is served by a second network element/switch 704. The POTS dial tone is preferably provided to all ports even before Subscriber A becomes a subscriber to a telephony service, wherein the dial tone is initially operable for database registration only. Accordingly, the PID profile record in the remote database 714 is updated with the port ID for the port 708 and its routing information. A local database 712 associated with the second network

element 704 may also be correspondingly updated. When the originating party 703 initiates a call to Subscriber A using the PID and communication type identifier, the first network element 702 determines that Subscriber A has de-registered from the port 706 and, accordingly, queries the remote database 714 for the current routing information. Thereafter, the call is "ported" to the second network element 704 which completes the call. It should be appreciated that because different LATAs and carriers may be involved, path 720 depicted in FIG. 7 may involve one or more networks for appropriate routing. Similarly, paths 716 and 718 used by the network elements to query the remote database may also involve several types of networks, e.g., the Internet, for Web-based access.

FIGS. 8A and 8B depict a flow chart which illustrates the steps involved in an exemplary call porting method for accomplishing universal mobility in a communications network system such as the network system 700 described hereinabove. Upon subscribing to a telephony service (step 802), a subscriber's PID profile record may be updated by the telephony service provider or by the subscriber to associate new telephone information with the subscriber's PID indicium. Accordingly, when the subscriber registers at the universal communications database using a physical port served by a network element, the port ID and routing information associated therewith are mapped into the PID's profile record (step 804). Thereafter, when a message signal indicative of a phone call directed to the subscriber is received in the network element (step 806), the local database is queried to determine the current local port ID associated with the subscriber's PID (decision block 808). If the current local port ID is available for the subscriber, the call is then delivered (step 810) in

accordance with the preferences, if any (step 810). On the other hand, if the subscriber is no longer at the local port, a remote database is queried (step 812) as explained hereinabove. Accordingly, the new port ID and serving switch information is retrieved from the remote database for call routing (step 814). The call is then ported to the new serving switch for call delivery (step 816).

If the subscriber moves out of the new location (decision block 816), the subscriber de-registers from the current port (step 820) and re-registers at the remote database using the next new port available at the next new location (step 822).

Based on the foregoing, those skilled in the art should appreciate that the present invention's universal communications database system and method provides an innovative solution wherein the various deficiencies and shortcomings set forth in the Background section of the present patent application are advantageously overcome. The mapping of a single unique PID to multiple communication events and treatment data associated therewith obviates the need to carry a plethora of contact numbers and addresses for various subscribers. As should be appreciated by those skilled in the art, a number of new services can be offered by utilizing the capability of the universal communications database of the present invention. For example, in addition to PID-based dialing, the following services are illustrative:

- email ID-based dialing;
- screen-name (assigned by ISPs)-based dialing;
- diverting calls to a secondary telephone number when the primary telephone number is busy or not answering the call;

- call screening based on PIDs;
- call screening based on video clips associated with PIDs;
- calling party information display based on personal information stored; and
- name-based dialing.

Because the PID database of the present invention eliminates the need to remember telephone numbers, which may change frequently, an alternative solution to Local Number Portability is advantageously realized by the practice of the teachings of the present invention. A subscriber is no longer tied to a particular port or to a specific central office switch. There is no "porting" of the telephone number; rather, the subscription is allowed to move with the subscriber who can roam anywhere the service provider has service agreements via the universal communications database.

Further, it should be recognized that any database that allows de-coupling of telephone subscriptions from the physical ports of a network as described hereinabove (e.g., by providing a mapping between port IDs and subscribers) may be used in lieu of a national PID database for accomplishing universal mobility in accordance herewith. That is, registration as set forth in the foregoing description does not have to be necessarily dependent on the national PID database. Rather, a telephone company (telco) can allow its subscribers roam and register from different ports by using its own database. Subscribers may be allowed to register from visited locations (served by different telcos, for example) by making arrangements with other operating companies.

Also, registration from a physical port may be customized such that it can be for (i) origination only, (ii) termination only, or (iii) both.

Moreover, multiple subscribers may register at a port whereby primary, secondary, et cetera, users may be specified. Accordingly, call treatment can be different for the users depending upon their designation. For instance, in order to invoke one's originating privileges, a user registered as a secondary subscriber will have to identify himself first as the secondary user before proceeding further. The registration for the secondary subscriber can be for the duration of a single call or a sequence of calls; or it can be valid until canceled. That is, different procedures have to be invoked for each case. In the case of a user registered as a primary user, the registration is provided on a "permanent" basis, i.e., until canceled.

Additionally, telcos can eliminate the need to disconnect a user's subscription from one location and start a new subscription from a new location by practicing the teachings of the present invention. As there are virtually millions of such operations taking place on an yearly basis, these costs can be avoided accordingly. From a subscriber's point of view, one can move into a new location and start the telephone service without the connection or service setup delay. Also, a subscriber does not have to change the network address and associated service options when the subscriber moves from one geographic location to another. Furthermore, in the practice of the present invention it is no longer necessary to play announcements such as "the subscriber's new number is . . ." or "the number you have dialed is disconnected," and the like. It is believed that the operation and construction of the present invention will be apparent from the foregoing Detailed Description. While the system and method shown and described have been characterized as being preferred, it should be readily understood that various changes, modifications and

enhancements could be made therein without departing from the scope of the present invention as set forth in the following claims. For example, because of the integration of voice networks and IP-based data networks, the teachings of the present invention may be also be practiced advantageously in hybrid networks wherein a plethora of diverse personal communication devices may be employed for purposes of the present invention. For instance, such devices may comprise H.323-compatible terminals, Session Initiation Protocol (SIP)-based phones, and the like, in addition to pagers, Internet appliances, screen phones, facsimile machines, computers (personal computers, laptops, notebooks, palmtops, handheld devices, etc.), and the ubiquitous wireline and wireless phones. Further, it should be appreciated by those skilled in the art the universal communications database may be implemented using any known or hitherto unknown programming language(s), and may be architected using multiple hierarchical levels which may be interfaced with different types of networks. Additionally, it should be apparent that the database portions and profile records exemplified hereinabove are illustrative only; such database portions may be combined in any form or portion. Accordingly, those skilled in the art should readily appreciate that these and other variations, additions, modifications, enhancements, et cetera, are deemed to be within the ambit of the present invention whose scope is determined solely by the following claims.

WHAT IS CLAIMED IS:

1. A memory structure for storing a universal communications database usable in effectuating an integrated communications infrastructure, comprising:

a profile array including a plurality of Personal ID (PID) values, each of which is uniquely associated with a particular subscriber registering at said universal communications database;

at least one communication type identifier associated with each PID value, said communication type identifier operating to signify to a network element a particular communication event engaged with respect to a specific subscriber's PID value, wherein said communication type identifier forming one of a prefix and a suffix for said specific subscriber's PID value; and

a structure corresponding to each PID value for storing a plurality of treatment data relating to said PID value based on its communication type identifiers,

wherein when a signal indicative of a communication event is received in said network element, said signal including a specific PID value and associated communication type identifier, said signal is translated to provide appropriate treatment data for effectuating said communication event.

2. The memory structure for storing a universal communications database as set forth in claim 1, wherein each PID value comprises an alphabetical indicium based on said subscriber's personal name.

3. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises routing number information for said PID value based on one of its communication type identifiers.

4. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises wireline phone number information for said PID value based on one of its communication type identifiers.

5. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises wireless phone number information for said PID value based on one of its communication type identifiers.

6. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises pager number information for said PID value based on one of its communication type identifiers.

7. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises email address information for said PID value based on one of its communication type identifiers.

8. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises telephony port ID information for said PID value based on one of its communication type identifiers, said telephony port ID information relating to a telephony port currently used by said subscriber.

9. The memory structure for storing a universal communications database as set forth in claim 2, wherein said treatment data comprises facsimile transmission number information for said PID value based on one of its communication type identifiers.

10. The memory structure for storing a universal communications database as set forth in claim 2, wherein said communication event comprises a wireline telephone call.

11. The memory structure for storing a universal communications database as set forth in claim 2, wherein said communication event comprises a pager communication session.

12. The memory structure for storing a universal communications database as set forth in claim 2, wherein said communication event comprises an email communication session.

13. The memory structure for storing a universal communications database as set forth in claim 2, wherein said communication event comprises a wireless telephone call.

14. The memory structure for storing a universal communications database as set forth in claim 2, wherein said communication event comprises an Internet Protocol (IP)-based communication session.

15. The memory structure for storing a universal communications database as set forth in claim 2, wherein said communication event comprises a multimedia communication session.

16. The memory structure for storing a universal communications database as set forth in claim 2, further comprising a database portion for specifying access privileges for each of said PID values, said access privileges interacting with said treatment data in effectuating said communication event.

17. The memory structure for storing a universal communications database as set forth in claim 2, further comprising a database portion for specifying preference options for each of said PID values, said preference options interacting with said treatment data in effectuating said communication event.

18. A method of effectuating communication based on a Personal ID (PID) uniquely associated with a subscriber, comprising the steps of:

receiving, in a network element, a signal indicative of a communication event with respect to said subscriber, said signal including said PID and a communication type identifier;

analyzing, in said network element, said signal to identify said communication event by examining said communication type identifier;

querying a first database to determine appropriate treatment data for said communication event based on said PID;

effectuating said communication event based on said treatment data if available at said first database;

otherwise, querying a second database to obtain treatment data for said communication event based on said PID; and

effectuating said communication event based on said treatment data retrieved from said second database.

19. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said communication event comprises a wireline telephone call.

20. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said communication event comprises a wireless telephone call.

21. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said communication event comprises a pager communication session.

22. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said communication event comprises an email communication session.

23. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said communication event comprises a multimedia communication session.

24. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said communication event comprises an Internet Protocol (IP)-based communication session.

25. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said PID comprises an alphabetical indicium based on said subscriber's name and said communication type identifier forms a prefix to said alphabetical indicium.

26. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said PID comprises an alphabetical indicium based on said subscriber's name and said communication type identifier forms a suffix to said alphabetical indicium.

27. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, wherein said PID comprises an alphabetical indicium based on said subscriber's name and said communication type identifier forms an extension to said alphabetical indicium.

28. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, further comprising the step of:

obtaining a preference option profile for said PID from said first database and modulating said treatment data obtained therefrom in effectuating said communication event.

29. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 28, wherein said first database is a local database co-located with said network element.

30. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 29, wherein said second database is a regional database queryable by said network element.

31. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 29, wherein said second database is a national database queryable by said network element.

32. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 18, further comprising the step of:

obtaining a preference option profile for said PID from said second database and modulating said treatment data obtained therefrom in effectuating said communication event.

33. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 32, wherein said first database is a local database co-located with said network element.

34. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 33, wherein said second database is a regional database queryable by said network element.

35. The method of effectuating communication based on a PID uniquely associated with a subscriber as set forth in claim 33, wherein said second database is a national database queryable by said network element.

36. A computer-accessible medium operable with a network element, said network element interacting with a universal communications database having Personal ID (PID) indicia uniquely assigned to subscribers, wherein said computer-accessible medium carries a sequence of instructions provided for executing service logic with respect to a communication event based on said PID indicia and which service logic, when executed by a processor forming a portion of said network element, causes said processor to perform the steps of:

upon receiving in said network element a signal indicative of said communication event with respect to a particular subscriber, said signal including a specific PID indicium assigned to said subscriber and a communication type identifier, analyzing said signal to identify said communication event by examining said communication type identifier;

querying said universal communications database to determine appropriate treatment data for said communication event based on said PID indicium; and

effectuating said communication event based on said treatment data retrieved from said universal communications database.

37. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said specific PID indicium comprises said subscriber's name.

38. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier comprises an extension to said specific PID indicium.

39. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier comprises a prefix to said specific PID indicium.

40. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier comprises a suffix to said specific PID indicium.

41. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies an email communication with respect to said particular subscriber.

42. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies a wireless phone communication with respect to said particular subscriber.

43. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies a wireline phone communication with respect to said particular subscriber.

44. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies a multimedia communication with respect to said particular subscriber.

45. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies a facsimile transmission communication with respect to said particular subscriber.

46. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies a pager communication with respect to said particular subscriber.

47. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies an Internet communication with respect to said particular subscriber.

48. The computer-accessible medium operable with a network element as set forth in claim 36, wherein said communication type identifier identifies an Internet Protocol (IP)-based communication with respect to said particular subscriber.

49. A database record management method for use with a hierarchically organized database arrangement operably coupled to a network element in effectuating multiple types of communication based on Personal ID (PID) indicia uniquely assigned to subscribers, wherein a communication type identifier is coupled to a particular PID indicium assigned to a specific subscriber for identifying a communication event, said method comprising the steps of:

receiving, in said network element, a signal indicative of a particular communication event with respect to said specific subscriber, said signal including said PID indicium assigned to said specific subscriber and said communication type identifier;

determining if said PID indicium is unknown to a local database associated with said network element;

if so, querying by said network element a remote database for a profile record associated with said specific subscriber, said profile record including said specific subscriber's PID indicium and treatment data relating to said specific subscriber's PID;

processing, by said network element, said treatment data based on said communication type to effectuate said particular communication event;

updating said local database associated with said network element by adding said profile record for said specific subscriber;

requesting, by said network element, said remote database to inform said local database when any changes in said profile record are effectuated at said remote database; and

deleting said profile record associated with said specific subscriber's PID from said local database if said profile record is not used by said network element in a predetermined time period.

50. The database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 49, wherein said remote database is a regional database.

51. The database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 49, wherein said remote database is a national database.

52. The database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 49, wherein said profile record further includes preferences data for said specific subscriber.

53. The database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 52, wherein said step of processing said treatment data is includes the step of interacting with said preferences data in effectuating said particular communication event.

54. The database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 49, wherein said profile record further includes access privileges data for said specific subscriber.

55. The database record management method for use with a network element in effectuating multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 54, wherein said step of processing said treatment data is includes the step of interacting with said access privileges data in effectuating said particular communication event.

56. A communications network for supporting multiple types of communication based on Personal ID (PID) indicia uniquely assigned to subscribers, comprising:

a network element for receiving a signal indicative of a communication event with respect to a specific subscriber, said signal including a unique PID indicium assigned to said specific subscriber and a communication type identifier for identifying said communication event's type;

means in said network element for analyzing said signal to determine said communication event's type based on said communication type identifier;

a database structure associated with said network element, said database structure including PID data and a plurality of profile records associated therewith, each profile record containing treatment data, access privileges data and preference options data for a particular subscriber, wherein said treatment data, said access privileges data and said preference options data are provided for each type of communication supported for said particular subscriber;

means in said network element for querying said database structure if said communication event can be processed based on said unique PID indicium assigned to said specific subscriber and said communication type identifier;

if so, processing said communication event based on at least one of said treatment data, said access privileges data and said preference options data for said specific subscriber;

otherwise, querying a remote database structure for said treatment data, said access privileges data and said preference options data with respect to said communication event for said specific subscriber; and

effectuating said communication event for said specific subscriber using at least one of said treatment data, said access privileges data and said preference options data retrieved from said remote database structure.

57. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 56, wherein said unique PID indicium comprises an alphabetical portion based on said specific subscriber's name.

58. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication type identifier comprises a prefix to said alphabetical portion based on said specific subscriber's name.

59. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication type identifier comprises a suffix to said alphabetical portion based on said specific subscriber's name.

60. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication type identifier comprises an extension to said alphabetical portion based on said specific subscriber's name.

61. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises a wireless phone communication.

62. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises a wireline phone communication.

63. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises a pager communication.

64. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises a facsimile transmission communication.

65. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises a multimedia communication.

66. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises an Internet communication.

67. The communications network for supporting multiple types of communication based on PID indicia uniquely assigned to subscribers as set forth in claim 57, wherein said communication event comprises an email communication.

68. A call porting method for providing universal mobility to subscribers in a communications network having a database for storing Personal ID (PID) data uniquely assigned to subscribers and a plurality of profile records associated therewith, each profile record containing an association between said PID data and a current telephony port address for a particular subscriber, said call porting method comprising the steps of:

subscribing, by a user, to a telephony service provided by a first service provider;

registering at said database by said user using a first telephony port with a first telephony port address that is served by a first network element operated by said first service provider, whereby said first telephony port address is associated with said user's unique PID;

receiving, in said first network element, a signal indicative of a phone call with respect to said user, said signal including said user's unique PID;

determining, in said first network element, if said phone call can be effectuated by ascertaining whether said user's PID is currently associated with said first telephony port address;

if so, effectuating said phone call using said first telephony port address;

otherwise, querying said database by said first network element to determine if said user has registered said user's PID from a second telephony port address;

if so, obtaining said second telephony port address for said user; and

effectuating said phone call for said user using said second telephony port address.

69. The call porting method for providing universal mobility to subscribers in a communications network as set forth in claim 68, wherein said user's unique PID comprises an alphabetical portion based on said user's name.

70. The call porting method for providing universal mobility to subscribers in a communications network as set forth in claim 69, wherein said second telephony port address is served by said first network element.

71. The call porting method for providing universal mobility to subscribers in a communications network as set forth in claim 69, wherein said second telephony port address is served by a remote network element.

72. The call porting method for providing universal mobility to subscribers in a communications network as set forth in claim 69, wherein said second telephony port address is served by a second service provider.

73. The call porting method for providing universal mobility to subscribers in a communications network as set forth in claim 69, wherein said first and second telephony port addresses are located in different geographical areas.

74. The call porting method for providing universal mobility to subscribers in a communications network as set forth in claim 69, wherein said first and second telephony port addresses are located in different Local Access and Transport Areas (LATAs).

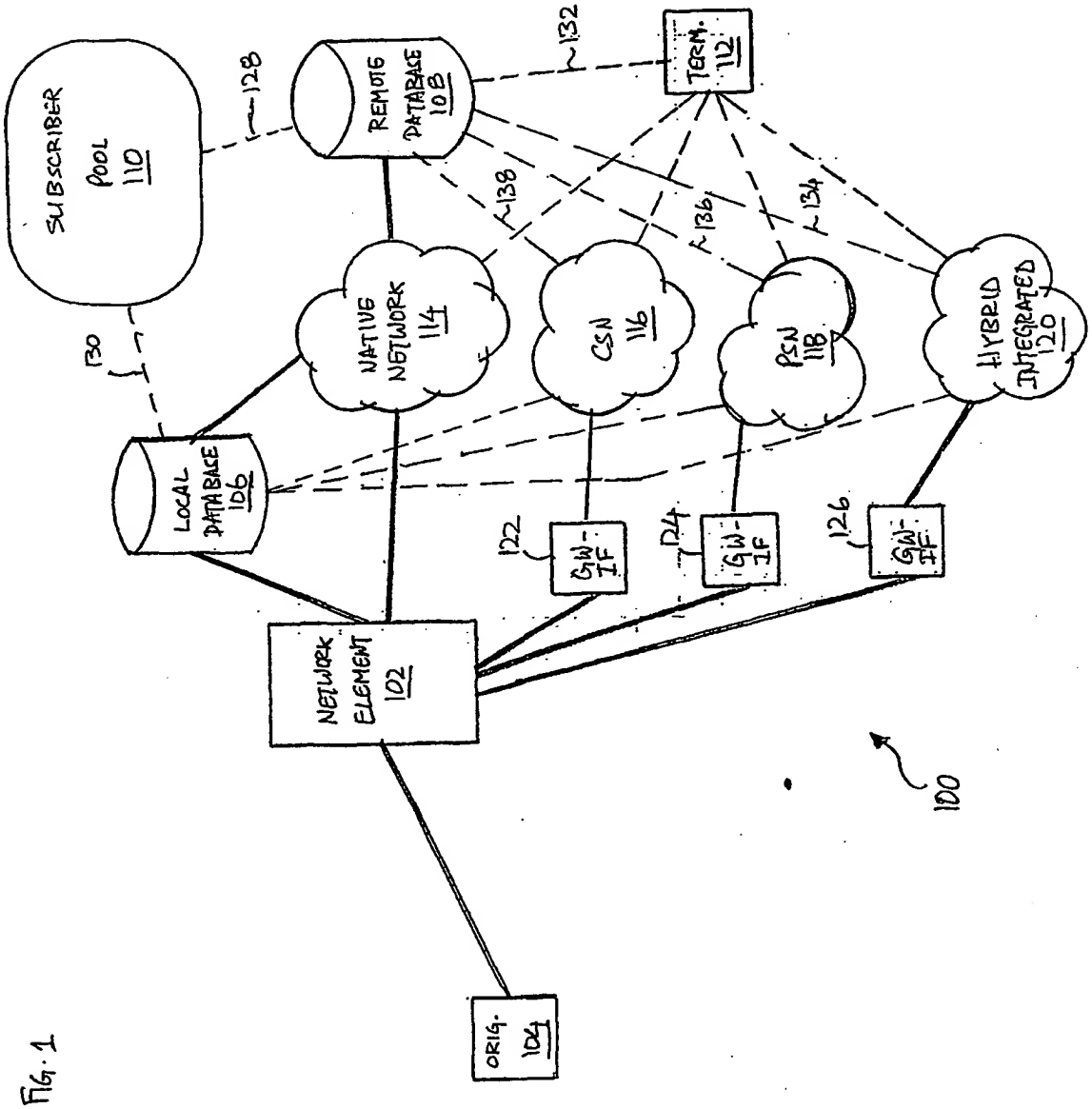

SUBSCRIBER POOL 110
128
REMOTE DATABASE 108
132
TERM. 112
138
136
134
NATIVE NETWORK 114
CSN 116
PSN 118
HYBRID INTEGRATED 120
130
LOCAL DATABASE 106
122
GW-IF
124
GW-IF
126
GW-IF
NETWORK ELEMENT 102
ORIG. 104
100

Fig. 1

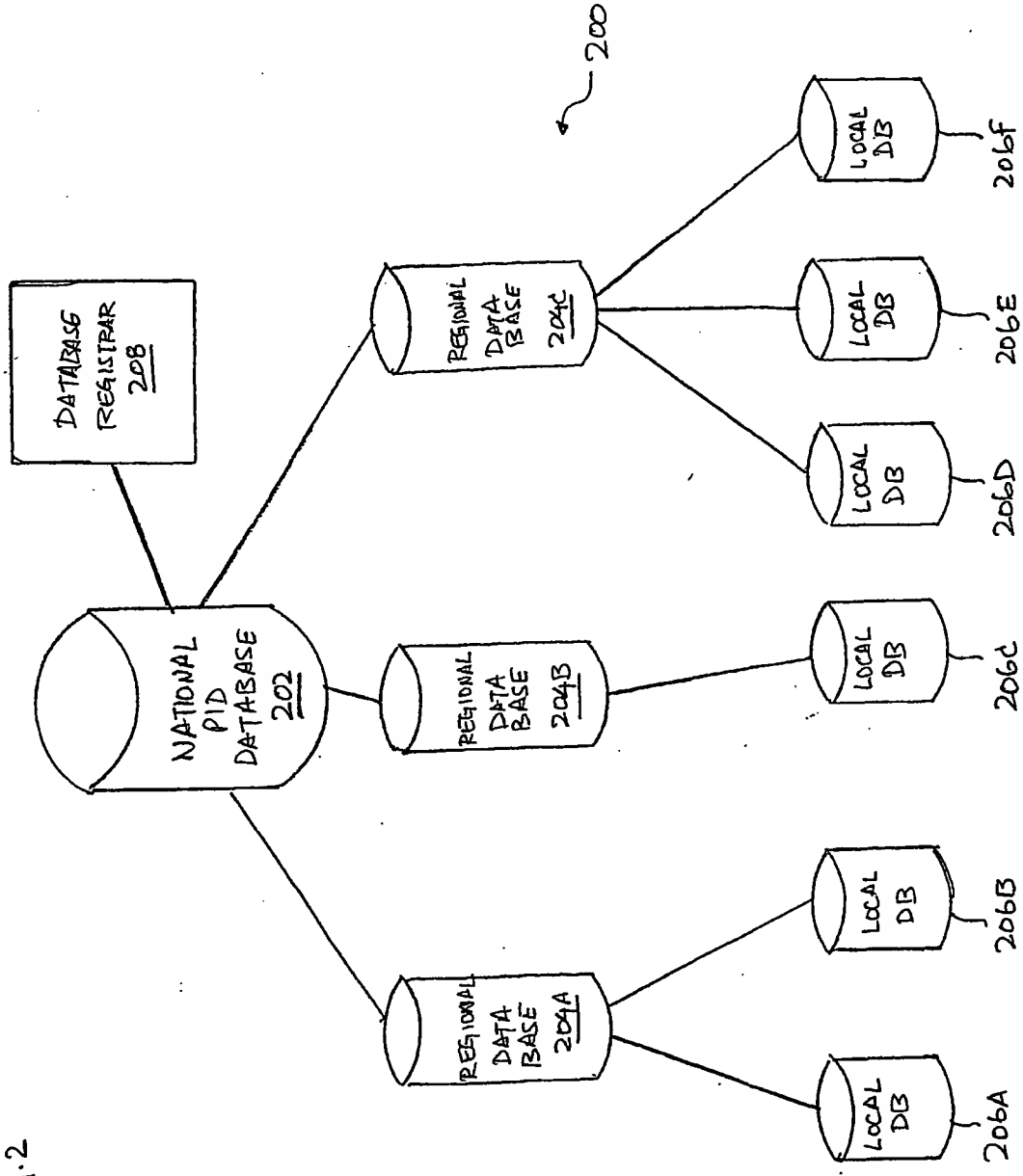

200
DATABASE REGISTRAR 208
NATIONAL PID DATABASE 202
REGIONAL DATA BASE 204A
REGIONAL DATA BASE 204B
REGIONAL DATA BASE 204C
LOCAL DB 206A
LOCAL DB 206B
LOCAL DB 206C
LOCAL DB 206D
LOCAL DB 206E
LOCAL DB 206F

Fig. 2

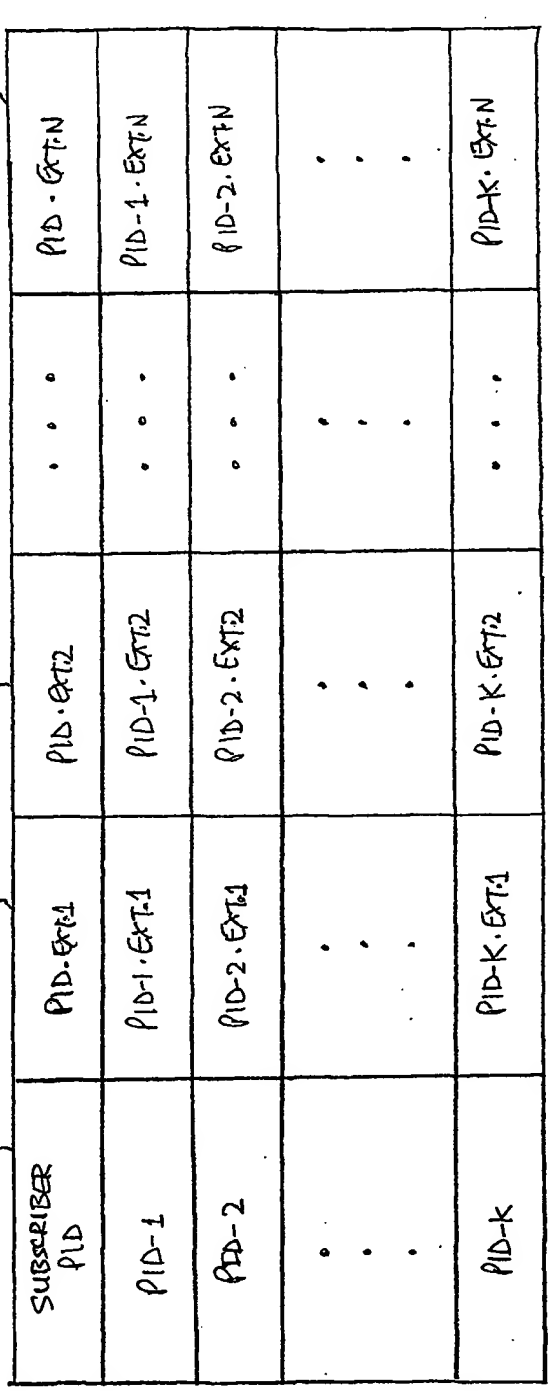
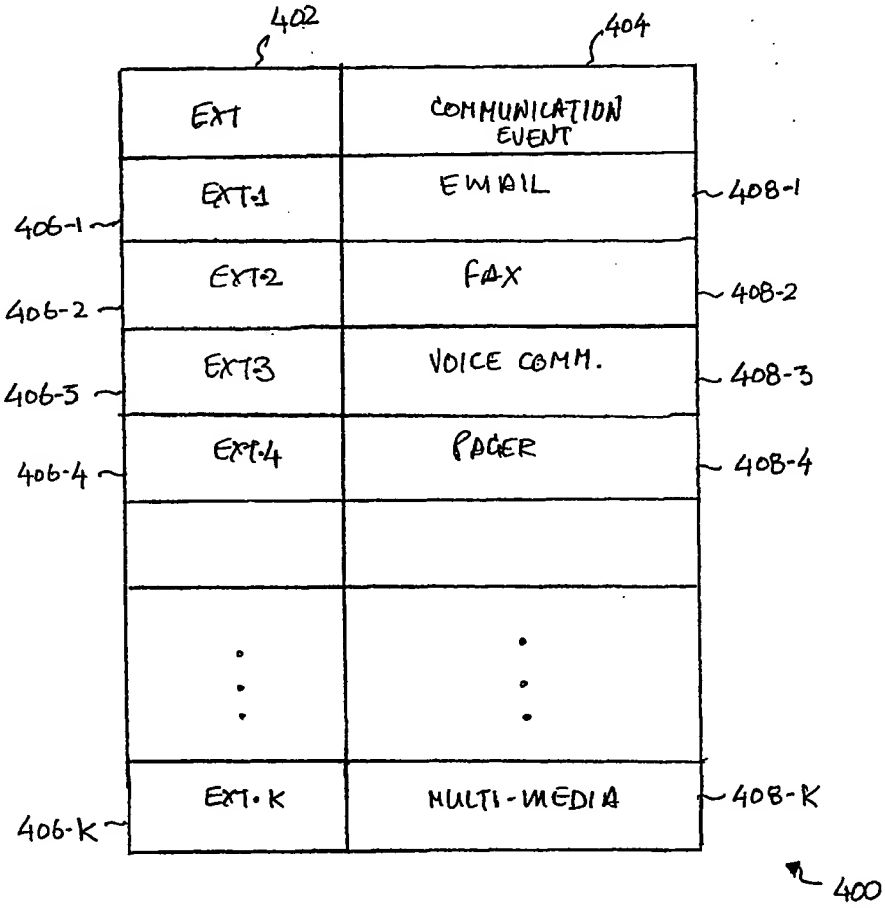

300
302
304-1
304-2
304-N
SUBSCRIBER PID
PID-EXT.1
PID-EXT2
PID-EXT.N
PID-1
PID-1·EXT.1
PID-1·EXT2
PID-1·EXT.N
PID-2
PID-2·EXT.1
PID-2·EXT2
PID-2·EXT.N
PID-K
PID-K·EXT.1
PID-K·EXT2
PID-K·EXT.N

FIG. 3

FIG. 4A


402
404
EXT
COMMUNICATION EVENT
EXT-1
EMAIL
406-1
408-1
EXT-2
FAX
406-2
408-2
EXT3
VOICE COMM.
406-3
408-3
EXT-4
PAGER
406-4
408-4
EXT-K
MULTI-MEDIA
406-K
408-K
400

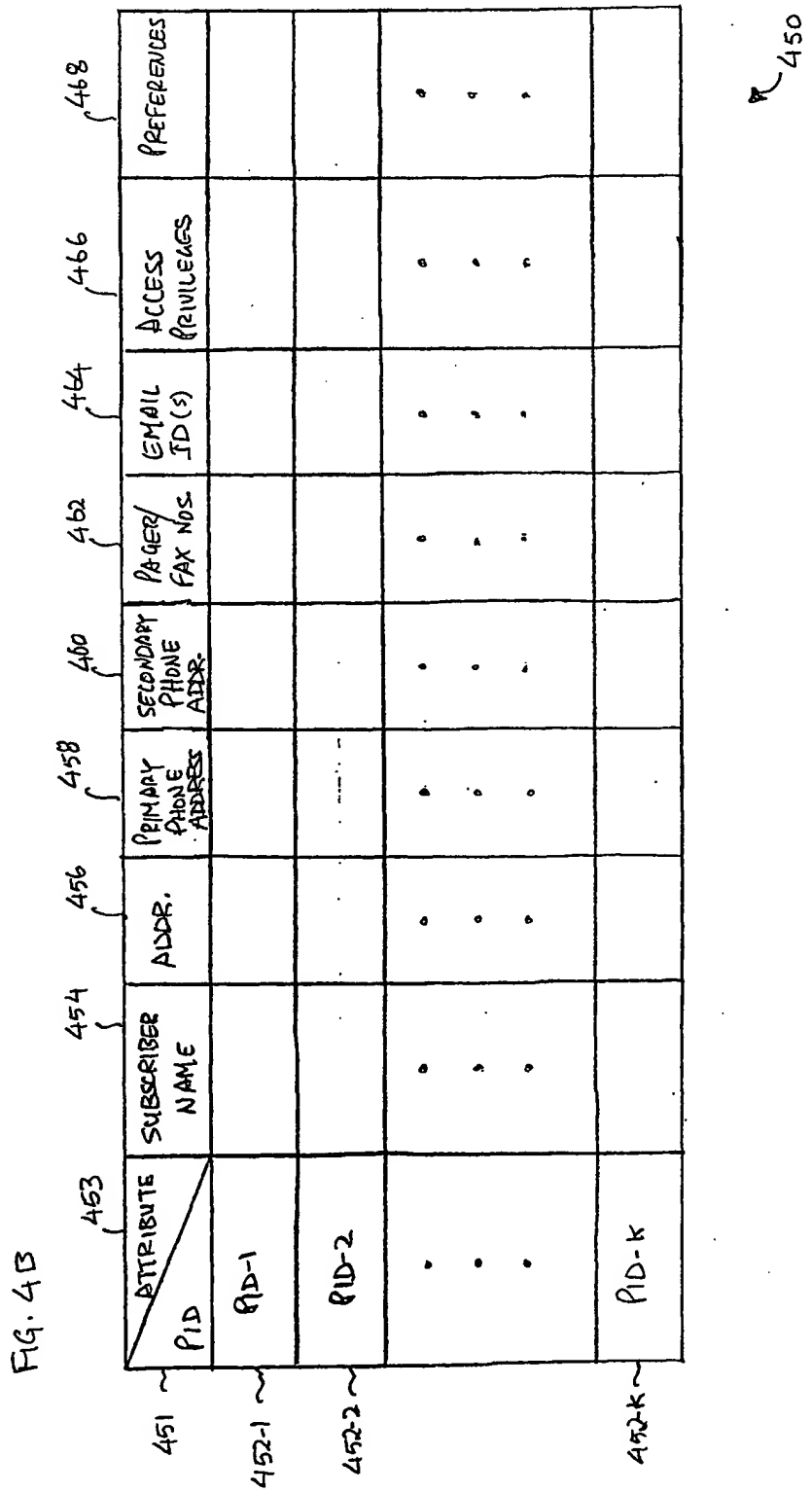

453
ATTRIBUTES
PID
454
SUBSCRIBER NAME
456
ADDR.
458
PRIMARY PHONE ADDRESS
460
SECONDARY PHONE ADDR.
462
PAGER/ FAX NOS
464
EMAIL ID(S)
466
ACCESS PRIVILEGES
468
PREFERENCES
450
451
452-1
452-2
452-K
PID-1
PID-2
PID-K

FIG. 4B

FIG. 5

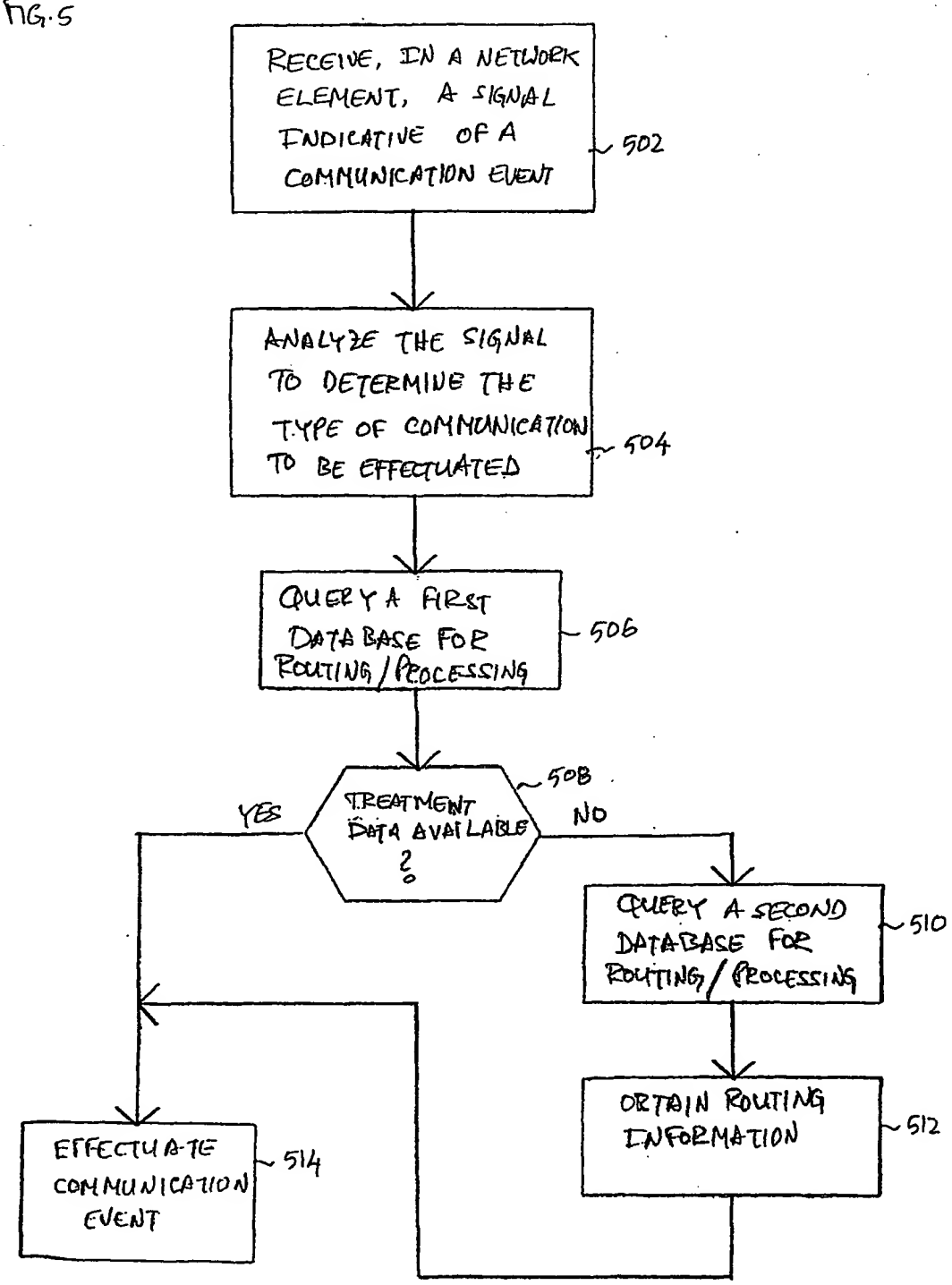

RECEIVE, IN A NETWORK ELEMENT, A SIGNAL INDICATIVE OF A COMMUNICATION EVENT
502
ANALYZE THE SIGNAL TO DETERMINE THE TYPE OF COMMUNICATION TO BE EFFECTUATED
504
QUERY A FIRST DATA BASE FOR ROUTING/PROCESSING
506
TREATMENT DATA AVAILABLE ?
508
YES
NO
QUERY A SECOND DATABASE FOR ROUTING/PROCESSING
510
OBTAIN ROUTING INFORMATION
512
EFFECTUATE COMMUNICATION EVENT
514

FIG. 6A

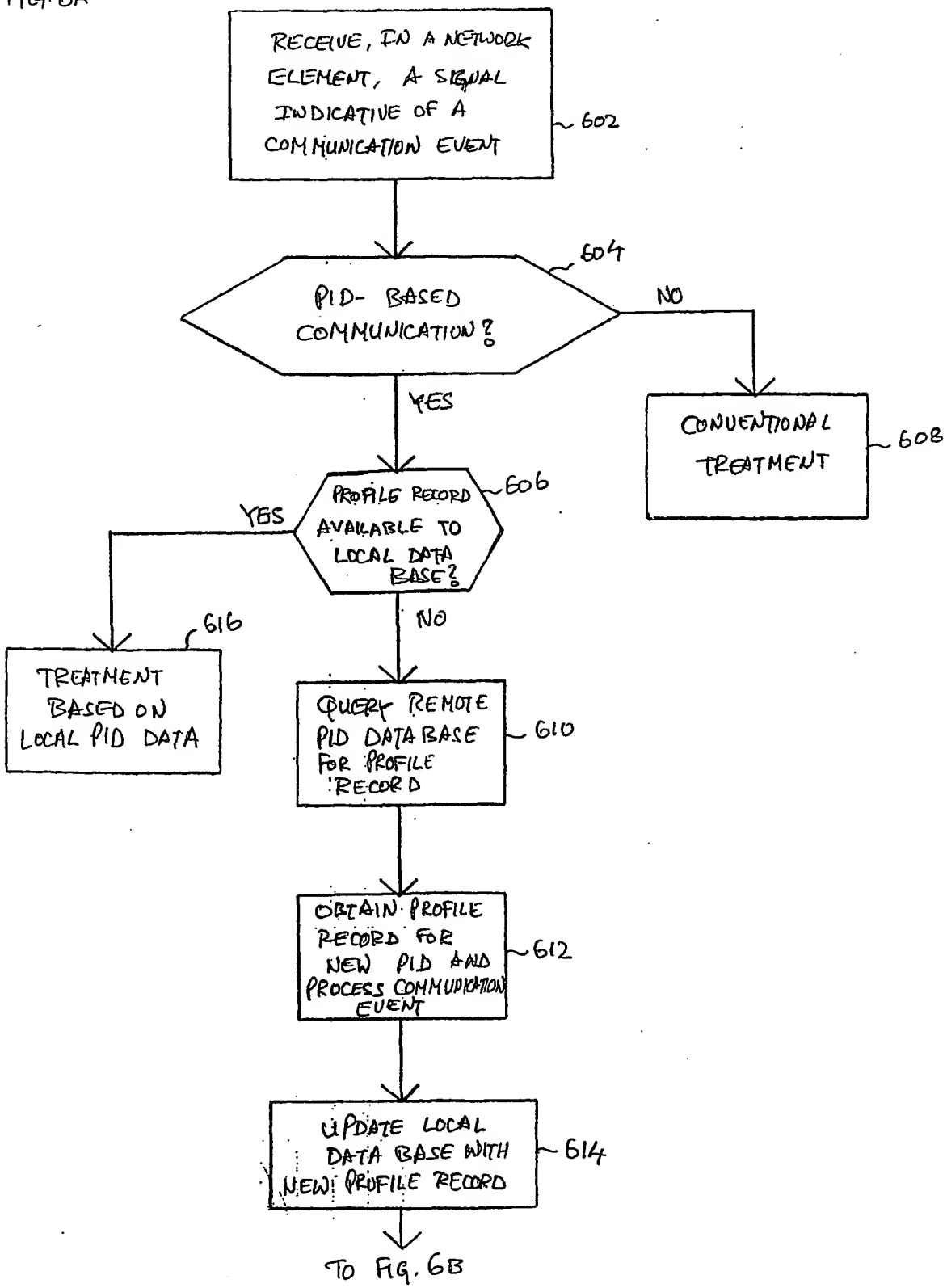
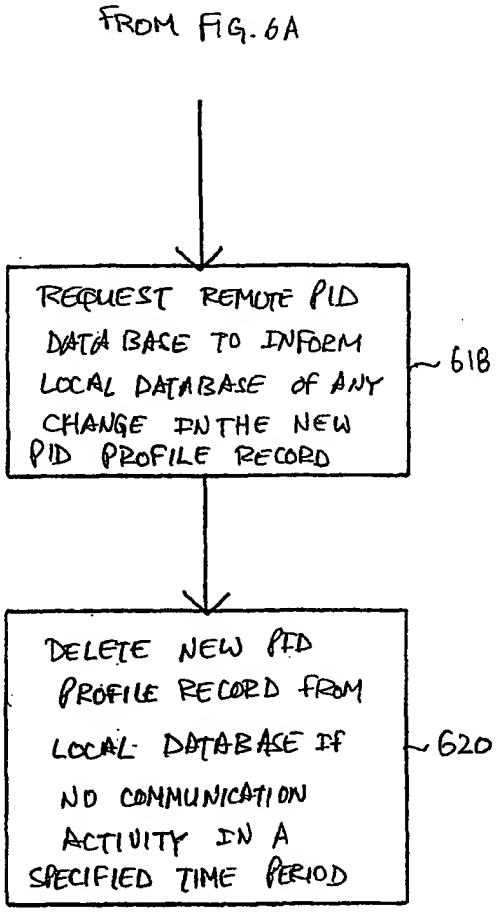

RECEIVE, IN A NETWORK ELEMENT, A SIGNAL INDICATIVE OF A COMMUNICATION EVENT
602
PID-BASED COMMUNICATION?
604
NO
YES
CONVENTIONAL TREATMENT
608
PROFILE RECORD AVAILABLE TO LOCAL DATA BASE?
606
YES
NO
TREATMENT BASED ON LOCAL PID DATA
616
QUERY REMOTE PID DATABASE FOR PROFILE RECORD
610
OBTAIN PROFILE RECORD FOR NEW PID AND PROCESS COMMUNICATION EVENT
612
UPDATE LOCAL DATA BASE WITH NEW PROFILE RECORD
614
TO FIG. 6B

FIG. 6B


FROM FIG. 6A
REQUEST REMOTE PID DATA BASE TO INFORM LOCAL DATABASE OF ANY CHANGE IN THE NEW PID PROFILE RECORD
618
DELETE NEW PID PROFILE RECORD FROM LOCAL DATABASE IF NO COMMUNICATION ACTIVITY IN A SPECIFIED TIME PERIOD
620

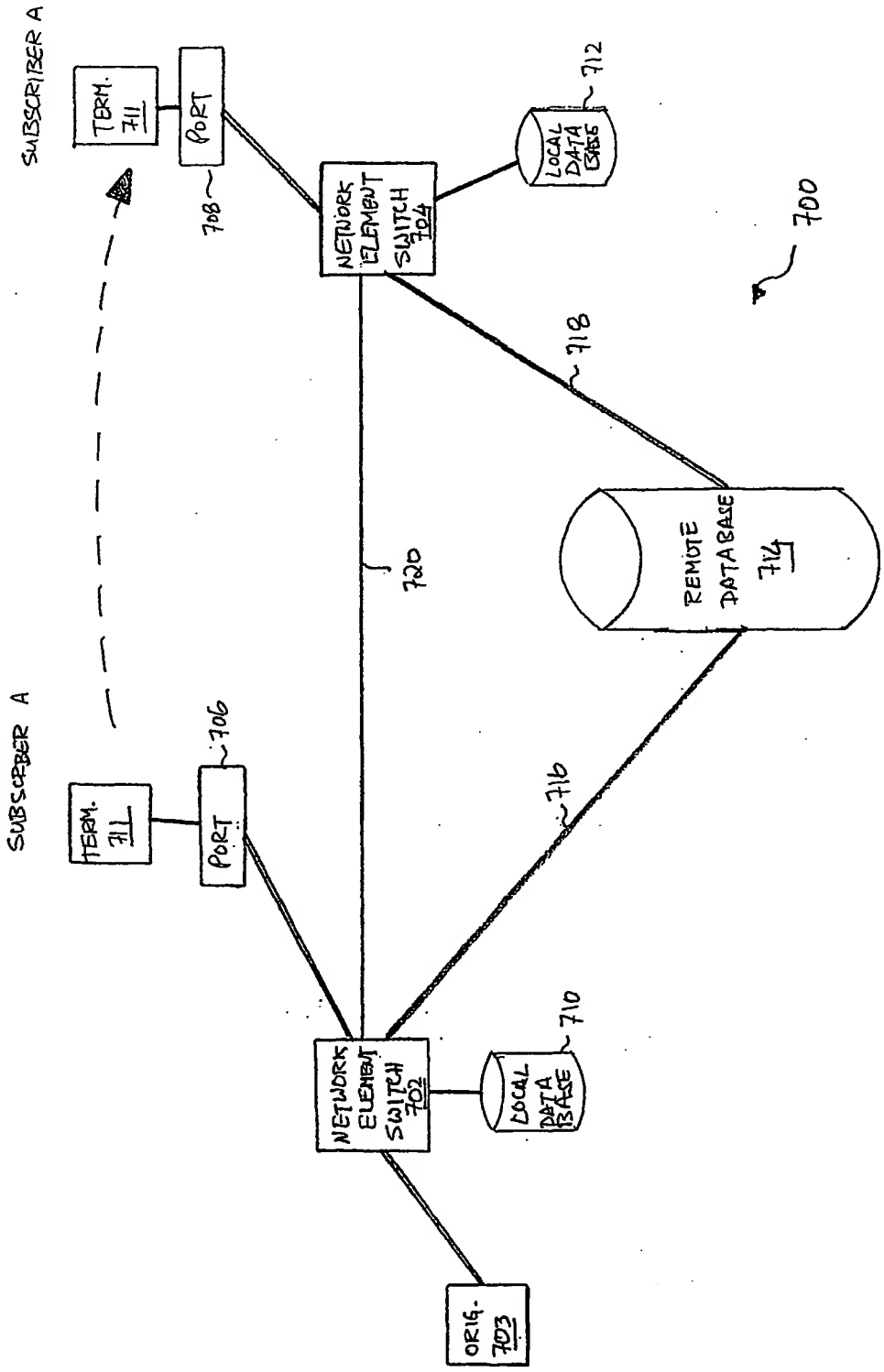

SUBSCRIBER A
TERM. 711
PORT
708
712
LOCAL DATA BASE
NETWORK ELEMENT SWITCH 704
700
718
REMOTE DATA BASE 714
720
SUBSCRIBER A
TERM. 711
706
PORT
716
NETWORK ELEMENT SWITCH 702
710
LOCAL DATA BASE
ORIG. 703

Fig. 7

FIG. 8A

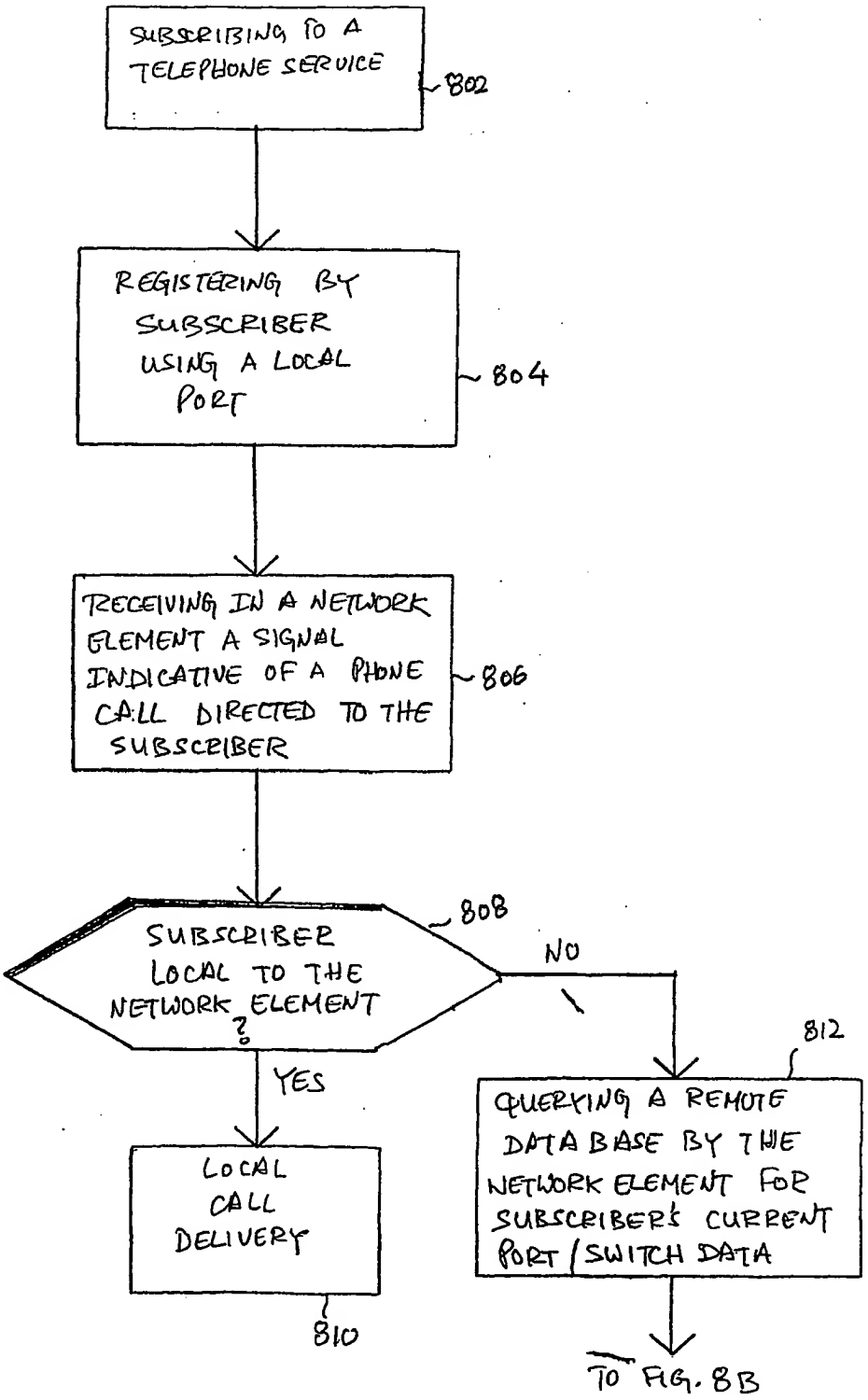
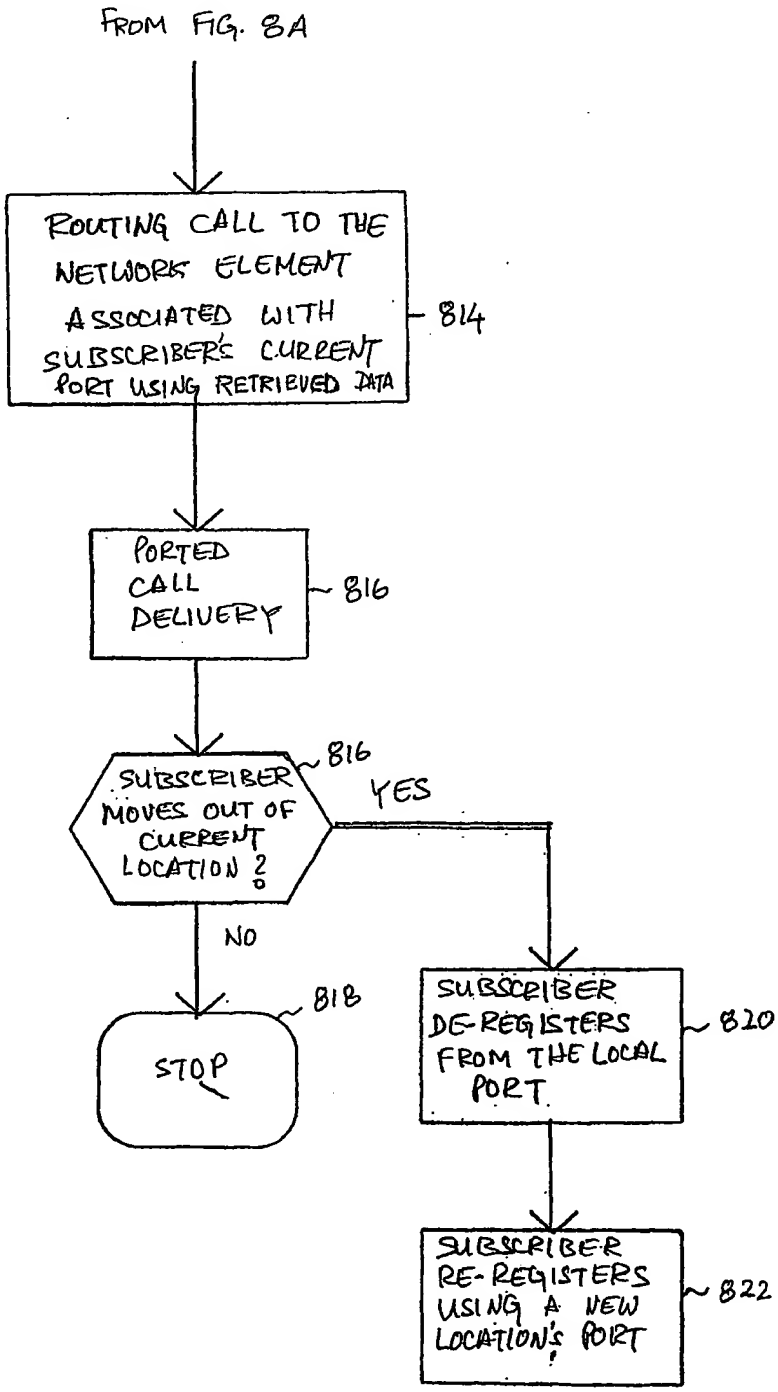

SUBSCRIBING TO A TELEPHONE SERVICE
802
REGISTERING BY SUBSCRIBER USING A LOCAL PORT
804
RECEIVING IN A NETWORK ELEMENT A SIGNAL INDICATIVE OF A PHONE CALL DIRECTED TO THE SUBSCRIBER
806
SUBSCRIBER LOCAL TO THE NETWORK ELEMENT ?
808
NO
YES
LOCAL CALL DELIVERY
810
QUERYING A REMOTE DATA BASE BY THE NETWORK ELEMENT FOR SUBSCRIBER'S CURRENT PORT / SWITCH DATA
812
TO FIG. 8B

FIG. 8B


FROM FIG. 8A
ROUTING CALL TO THE NETWORK ELEMENT ASSOCIATED WITH SUBSCRIBER'S CURRENT PORT USING RETRIEVED DATA
814
PORTED CALL DELIVERY
816
SUBSCRIBER MOVES OUT OF CURRENT LOCATION ?
816
YES
NO
STOP
818
SUBSCRIBER DE-REGISTERS FROM THE LOCAL PORT
820
SUBSCRIBER RE-REGISTERS USING A NEW LOCATION'S PORT
822